• Contact via: www.g7ddn.com

Network Radio

Chris Rolinson G7DDN addresses the question "What is Network Radio and why could it be good for amateur radio?"

In the run up to Christmas last year, I started getting a few e-mails from a Portuguese amateur, Duarte CT1EIZ, extolling the virtues of something he was referring to as Network Radios. I visited his website shop to have a look but came away thinking, like most of us, I suspect, *"What? They're just adapted Android smartphones with a PTT button on them. What is the point of that?"*

I was nonetheless intrigued because I have always had a suspicion that amateur radio and mobile technology could have a mutually beneficial relationship, if only… After all, just about every person on the planet carries an RF transceiver with them these days!

However, to date, amateur radio has had a difficult relationship with smartphones. Whenever we try to explain our hobby to anyone remotely showing interest, they tend to smile at us (or, worse still, laugh!) and say something along the lines of, *"I can do all you describe with this electronic slab in my pocket – what do I need amateur radio for?"*

And, let's be honest, we haven't been very effective at answering what is a fair question.

A Little History

Those of us of a certain age (myself included) can usually point to a 'magic moment' when radio touched our lives. For me it was picking up Swiss Radio International on the 31m broadcast band when I was about six. That was it. I was hooked!

But with the demise of shortwave radio, which has resulted in broadcasters (and other users) increasingly moving to online streaming, the nature of radio, and thus the way people experience it, has changed. Arguably, no one under the age of 40 has a radio 'moment of magic' similar to the one I describe above anymore.

My stepson's 18-year-old girlfriend wandered into my shack one day a few years ago and floored me when she asked what the tuning knob on my Elecraft K3 was and what it did. I had never thought that anyone would not know how to tune in a radio signal! It was an eye-opening moment.

It was then I realised that radio to most folk today is either a push-button device or (increasingly) something you stream over the internet. What we as amateurs take for granted is not how most people experience radio any more.

Fig 1: A Talkpod N58 running Zello & an Inrico T320 monitoring a Topband WebSDR. The desktop behind is running IRN.

So, if it is difficult for the average under-40 to see that amateur radio has a lot to offer them, perhaps Network Radios are actually that 'crossover' product that could help make us relevant again.

What is a Network Radio?

A Network Radio is a radio that uses a Network (obvious really!), thus, by extension, the internet in some form, accessed either via a WiFi or a cellular network.

I have been licensed long enough to know that some may object to this instantaneously by retorting, *"Well if doesn't transmit on an amateur band, it's not real amateur radio!"*

No-one could deny that these devices do not transmit on amateur bands but does that mean it cannot be considered amateur radio in any form whatsoever?

A Computer in Your Pocket...

In essence, a Network Radio is a pocket computer with a few add-ons. These devices have been designed from the outset for two-way radio users and the business sector at that.

Sporting the PTT hardware button as the major difference from a 'normal' smartphone, they also generally have smaller touchscreens in order to fit the HT form factor. They have very loud speakers for outdoor use and are also extremely rugged to handle. Most people who have played with one are reminded of heavy duty Motorola-style PMR gear. The photo, **Fig. 1**, shows a couple of popular models.

...and All That Implies

And because they are computers with PTT, they add some very useful features to existing amateur radio products.

One of my friends has set up his remote station in Scotland with Remote Hams software. He now uses it with his Inrico T298 Network HT. He controls the radio with his Network Radio's touchscreen and uses the PTT to send the remote HF radio into transmit.

He can now access his station from pretty much anywhere in the world where there is a WiFi or cellular signal but via what looks like and works like an HT. In effect, he has a 200-mile-long microphone-lead with front panel controls!

There's an App for That!

Almost any Android app can be adapted to work. Echolink has been updated this year to accept a hardware PTT button, so users can now access all kinds of repeaters and nodes from a Network Radio.

More exciting still is the International Radio Network (IRN), set up thanks to the foresight of Foundation Licence holder **Gareth M6IGJ**. This is a growing online network of amateur radio streams, accessed through an extremely robust voice-over-internet (VoIP) app called Teamspeak 3. It enables RF networks to come together using streaming computer technology so that, for example, I can sit in my house and transmit on my Network Radio, coming out on a repeater in Manchester, New York or Sydney. The RF cross-linking possibilities here are only just beginning to be explored but already there are examples of DMR, Fusion and D-STAR as well as analogue repeater streams coming in and out of the Network.

IRN is still growing and it is early days but there seems to be no reason why this might not mushroom to cover any and all kinds of amateur radio-related streaming audio. Clearly for all these uses, an amateur licence would still be required, although there are also areas of IRN that can be accessed by anyone, once issued with an IRN-style callsign, if not a licensed amateur.

Fig. 2: This is Rock Climbing... (Source: pixabay.com)

You Don't Need a PTT

Most non-PTT amateur apps work on these devices too, so APRSDroid, for example, turns your Network Radio into an APRS beacon, for about a fiver!

I've set up a few Remote SDRs such as Hack Green as shortcuts on my home page so I can listen to the amateur bands wherever and whenever I want.

WAB Finder is great for knowing which WAB square you are currently in; SOTA Finder helps you with your summit activations and there are plenty of broadcast radio apps, if Radio 4 is more to your listening taste.

Why All the Controversy?

Well, the main reason for all the controversy is that, in addition to all the above, they also work as Radio over Internet Protocol (RoIP) devices.

Put simply, you can contact other people (amateurs and non-amateurs) via PTT over the internet with no amateur licence required. The radios do not transmit on amateur frequencies but still work as 'radios', albeit using 'Internet Propagation'.

It's all about Propagation...

Most of us are aware that all radio signals from LF to Microwave are effectively line-of-sight. Enhanced propagation happens because of natural phenomena such as that which occurs in the ionosphere and the troposphere. Because we experience that on some bands most days of the year, it is easy to take it for granted.

The internet is now also a form of propagation for signals. Yes, they may well be digital signals but the internet is, in effect, a man-made form of enhancing signals so they travel longer distances than they otherwise would. Sometimes wires (or optical fibres) are involved, sometimes not.

This leads many to dismiss Network Radios out of hand. *"They do not transmit on 2m, so it's not 'real' amateur radio".* It's true they don't directly transmit on amateur bands. The real question is, does that matter? And, if so, how much does it matter?

An Example from Another Hobby

Let me try to draw a parallel – allow me to liken amateur radio to rock climbing.

The people in **Fig. 2** are rock climbing- but the people in **Fig. 3** are also rock climbing. The people in Fig. 2 are doing some pretty hair-raising things but, to my way of thinking, so are the people in Fig. 3. You won't catch me attempting either sort!

Yes, the man-made climbing wall (like the man-made internet propagation) is not the same as the mountain (ionospheric propagation) but it is still climbing, even if it is indoors (with no natural weather phenomena, either) and on a man-made structure.

Can you see the parallel I am trying to draw here? And here is the rub – do you think the advent of indoor climbing walls has attracted new people to the climbing hobby or has it put them off?

It's All About the Software...

In 2018, the internet is, for most people on the planet, the medium of choice for reliable long-distance communications and it is open to everyone – we are all 'end-users'. An app like Zello is particularly interesting to us as amateurs. Part social media, part PTT radio communications, it's a bridge between modern digital life and amateur radio. Zello allows us to create 'Two-way radio communities' with the safeguards of moderation built in.

Using Zello, we can effectively be our own end-users, our own 'Policemen' and to some degree even our own licensing authority because we can regulate both who can come on and their behaviour 'on the air'. If anyone on such a channel shows the kind of behaviour that we have all heard on repeaters over many years, they can simply be muted, blocked or even barred, never to be heard from again.

"It's Amateur Radio Jim, but not as we Know it"

There are a growing number of socially diverse amateur radio 'Communities' springing up on both IRN and Zello. DigiCommCafé is a worldwide group run from the USA, which has regular nets. There is a very active Network Radios group (mostly UK based) on Zello, which works just like any amateur radio channel and, I have to say, is a very friendly environment in which to make contacts. You will even meet enquirers to the hobby too because, of course, you don't need to have an amateur licence to use it. It's so popular that the organisers have had to open a 'Channel 2' to accommodate demand. I don't expect it to stop there…

My own club, Wythall Radio Club, has a Club Zello channel where we are the ones who set the rules. We insist it runs on amateur radio protocols and we moderate it accordingly. Members contact each other via the group. Unlicensed club members simply use a 'WRC callsign' that we allocate to them.

It's the End of Amateur Radio! Or is it?

You could view all this as apocalyptic, 'the end of the hobby as we know it', or you could see it as an opportunity for a long overdue injection of new ideas and new people into our radio world.

The so-called purists among us may never want to use the internet as propagation, which is fine, no one is forcing anyone to do so. I would, however, respectfully point out that many of us see no reason not to use internet propagation for such niceties as the DX Cluster, Reverse Beacon Network and PSK Reporter, just for starters.

Fig. 3: …and this is Rock Climbing too, yes? (Source: commons.wikimedia.org)

That is but one way our hobby has already adapted to new technologies. And, of course, there is eQSLing or setting up skeds via e-mail or online logging, all of which seem to be more than accepted now.

No one is suggesting we cease using our amateur bands. Goodness knows, we worked hard enough to get our licences to use them! But in these days of S9 noise, restricted back gardens, poor HF conditions, the challenges of physically erecting tall antennas and, dare I say, for some of us the distinct possibility of needing some form of care in the all-too-near future, what on earth is wrong with using Network Radios?

Crystal clear audio and S9+ signals pretty much 24/7 365 days a year. What's not to like? Are we going to dismiss them because they perhaps use 800MHz or 2.4GHz WiFi rather than 432MHz? Is that not entering the realm of splitting hairs?

No one is suggesting that Network Radios are going to replace our hobby as it stands but when we are able to take advantage of what new technologies can do for us, maybe we can finally reach out to 21st Century people after all and bring our great hobby, albeit maybe kicking and screaming just a little, more into the internet age.

It Grows and Grows...

Like it or not, I don't see this phenomenon doing anything but growing. Even the major radio retailers are now selling these devices.

In the 21st Century, technology is posing difficult questions of us as amateurs and one of the most difficult to come to terms with is the fact that we now have the power to make radio do whatever we want it to. That may sometimes involve taking us outside of our 'traditional' bands. What other kind of radio allows us to operate on an airliner 40,000 feet over the Atlantic Ocean or on the Cross-Channel ferry to France, with no need even to take an examination or hold a licence?

There is also an existential crisis that faces amateur radio. Probably more than 50% of our current demographic may no longer be with us within the next 20 years. Time may be running out for our great hobby, unless we embrace new technologies in a way that can attract new people to it. Will Network Radios play that role? Who knows? Either way, Pandora's box is open and the future could be very bright indeed and certainly this whole area is wide open for innovation. And innovation is where radio amateurs have historically always excelled, so what a great opportunity for us to shape another aspect of the future of our hobby.

Review by Tim Kirby G4VXE

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An Introduction to Network Radios with the Inrico T-320 and the Inrico TM-7

Tim Kirby G4VXE has been trying out Network Radio and getting to grips with a couple of transceivers in the process.

Over the last couple of months, like you, perhaps, I have read plenty about Network Radios. Like you too, I suspect, I have wondered where they fit into the hobby and what they are like to use. Courtesy of **Chris Taylor G0WTZ** of Moonraker, I had the chance to find out when he asked **Don** if *PW* would like to review them. Although I had some reservations about the idea of 'not using amateur bands RF', I looked forward to the arrival of the package and to see what could be done.

What follows is a record of my experiences with the two radios – partly the radios themselves and partly the Network Radios experience. I hope you will find it as interesting as I did.

What is a Network Radio?

You might be wondering, what exactly is a network radio? Simply, it is a smartphone that operates on the 3G/4G phone networks, usually with WiFi capabilities as well. The differentiating point between a 'regular' smartphone and a network radio is the form factor. In the case of the Inrico T320, it has the look and feel of a handheld radio, with a PTT button on the side. In the case of the Inrico TM-7 it has the look of a mobile radio attached to a microphone by the standard curly cable.

It's easy to underestimate the difference that this form factor makes. Because the units look and feel like the radios we are used to, you treat them in the same way. It is easy to forget that you are essentially using a phone, rather than an amateur bands transceiver.

Bear in mind that every use that I describe for both the T320 and the TM-7 can be carried out on a 'normal' smartphone, either Android or iOS. Indeed, you might want to try out some of the applications on your regular phone to see how you like them, before deciding to use a network radio. My experience is this. If you enjoy using the applications on your phone, curiously – you will find the Network Radio experience even more compulsive! I should also add that one key difference between the operation of a Network Radio and a Smartphone is when an app is running and a phone call comes in, a smartphone will default to the phone call whereas the Network Radio is configured such that the app takes precedence. If you don't use a SIM card, though, or use a data-only SIM, this is of no consequence.

And, of course, because these units do not use amateur bands RF, you do not need to have an amateur radio licence to use one. Many of the applications I will describe can be used by both licensed and unlicensed users. It is only when an application has a link to an amateur radio RF channel that you will need to prove you have an amateur radio licence. Perhaps the fact that the sets can be used by both licensed and unlicensed people makes you feel concerned? Don't be and I will explain why in due course *[and see also **Chris Rolinson's** article in this issue – **ed.**]*

The Inrico T320 4G/WiFi Network Handheld Radio

The T320 handheld was the radio that I unboxed first because I thought I would get it going in the house on WiFi and see what I could do. The first thing was to fit the battery and the small stubby antenna, which gives the rig an 'authentic handheld' look. It feels a good solid unit and fits nicely in the hand. The screen is a reasonable size and fairly bright although I had some problems seeing it in strong sunlight.

Powering on the unit displayed a welcome screen for 30 seconds or so as Android starts up. Once started, I swiped the screen to take me to where you can navigate between applications, settings and so on. The first thing was to go into settings and connect the unit to the house WiFi. I was pleased to find that it saw both 2.4GHz and 5GHz WiFi networks.

Entering the password on the small on-screen keyboard was slightly tricky but manageable. Now the unit was connected to the internet. When the rig arrives, there are no applications installed, other than the default Android ones. So, you will need to choose which applications you want to install. Applications are installed from the 'Play Store' icon. You will need to log in using your Google account, assuming you have one. Within the Play Store you nominate how you will pay for any 'paid for' applications.

The first I installed was Zello. This is a Voice over IP (VoIP) conferencing system. The application is free to install and to use. There are many thousands of channels but I was particularly interested to try out the 'Network Radios' channel, which several readers, including **Ian Abel G3ZHI** and **Karl Hobson G1YPQ** had kindly told me about. There are no direct connections to the amateur radio bands from Zello – it is wholly standalone – so both licensed and unlicensed operators can enjoy the features. I had already created a Zello account (using my callsign as a username, though you don't have to, of course) so I logged into Zello and connected to 'Network Radios'. When you first connect, only moderators can hear you. They have to establish you as a 'trusted user' so they

will have a quick conversation with you and confirm your interest in communication matters (in the widest sense). This 'light touch' moderation seems to work very well and is nicely done. If, and I have not heard it happen, someone was disruptive, then the moderators can simply block that user from the channel. I suspect some repeater keepers would love to be able to do that on FM! Once I had been 'trusted' I was able to join in with some very enjoyable conversations with people; mostly although not exclusively, amateur operators from all over the globe.

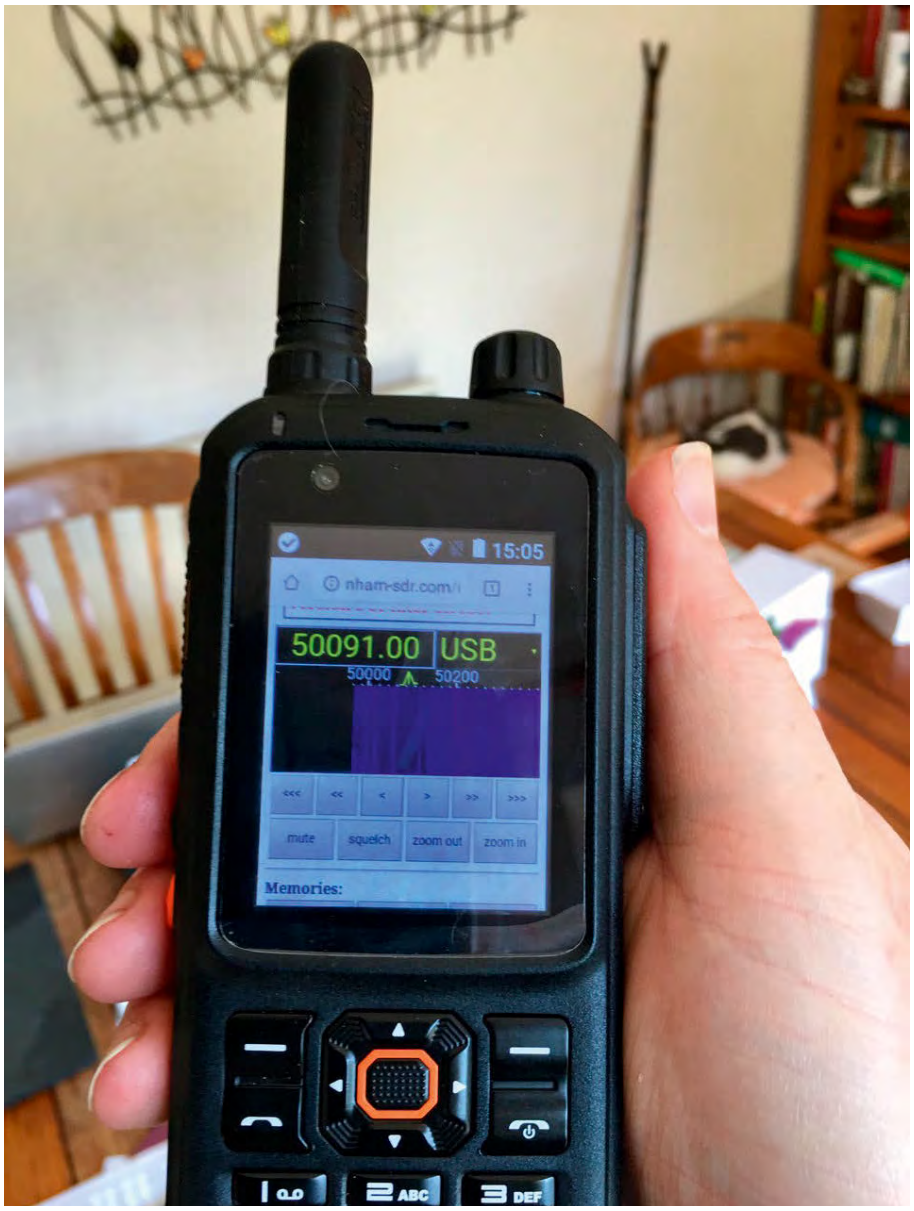
At first, I was very conscious that these were 'non-amateur-RF' contacts. But in answer to the question to my conscience, *"what does this have to do with amateur radio?",* I concluded it had a great deal to do with it! Perhaps, like face-to-face conversations at the radio club, we talk about radio, exchange ideas and quite often enthuse each other to try out new things on the radio. It was interesting to hear that a number of users were saying that they had been more active on the amateur bands as a result of using their network radios. It was also really nice to hear that some of the non-licensed people were thinking about getting their licence.

The audio quality from Zello was amazing. Despite having a small loudspeaker, the T320 has plenty of volume and the frequency response is much wider than we are used to as radio amateurs. There are also some nice features that you allow you send pictures or location details to other stations using the camera/GPS on the T320.

There were a few settings within Zello Options that I customised over time – for example, not to start Zello when the phone starts (more on that later) and not to keep history. Otherwise, Zello will record the various 'overs' that it hears, which can fill up storage on your phone. You can also adjust microphone volume and several other parameters.

The next application that I installed was Teamspeak 3. This allowed me to connect to the International Radio Network (IRN). You must set up a connection to the server for which you can find instructions at: **www.internationalradionetwork.co.uk/setting-up-with-irn**

Because I had already set up Teamspeak 3 on my iPhone to try it out and had created a Teamspeak account, I could sign in using that. This connected me to the IRN server and I was then free to move to the different talkgroups. When I had first connected to the IRN, there was a very simple validation process to prove that I was licensed. This is because some of the talkgroups are linked through to amateur RF so you can come out on analogue or digital repeaters. Other parts of the IRN such as the 'DigiComm Café' are open to both licensed and unlicensed users and, again, appear to be well moderated.



The Inrico T320 connected to the SUWS WebSDR, listening on 50MHz.

Another free application I wanted to install was Echolink. Many of you will be familiar with Echolink. This is only available to licensed radio amateurs because, other than point-to-point connections, users generally connect to a repeater or a conference. The Echolink application was free to install. This worked very well indeed and I enjoyed connecting to several Echolink-enabled repeaters around the UK and making some nice contacts. I have used Echolink occasionally on my iPhone for years, but it was nice to have the T320's PTT button rather than having to tap and hold the screen to transmit.

I installed HamGPS, which uses the GPS included in the T320 to work out the locator square where you are, a nice touch if you are out portable.

Chris Rolinson G7DDN suggested I try using the T320 to connect to some of the WebSDR receivers that are available through the internet. Good idea! I used the Chrome browser, which is already installed on the T320, to connect to the Hack Green SDR:
http://hackgreensdr.org:8901

This enabled me to listen on various HF bands, including Topband (160m). I first tried it one evening and was pleased to hear good friend of *PW*, **Mike G3SED** coming through very nicely. For VHF, I used the Southampton University WS SDR (link below), which allowed me to listen on 6m, 2m, 70cm and even 10GHz. This worked very well. You may prefer to install the Firefox browser because that seems to

Zello on the TM-7.

be what the WebSDR asks for but, in practice, I found that Chrome worked without any problems.

http://farnham-sdr.com

I also installed the APRSdroid application which connects to the APRS network through the internet. The application is paid for, although I did find a more basic free APRS application that allows you to send your location into the network such that it can then be seen on the **http://aprs.fi** website. Using APRSdroid I was able to send APRS messages and see stations plotted on the map as well as use it to send my position as I walked or drove around.

Network Connectivity

The T320 can take a SIM card so you can use it on the 3G/4G networks, for connectivity but rather than do this, I used my smartphone as a hotspot and connected the T320 to that by WiFi. This worked very well in both portable and mobile situations. Despite patchy network coverage around where I live, I found that my mobile on the front seat of the car, tethered to the T320 by WiFi, was fine for listening to Zello, Echolink or Teamspeak. If you want to use the T320 just for data, rather than as a phone as well, there are some prepaid SIM deals that allow you to buy gigabytes of data for a fixed sum. I found that using Zello, Teamspeak and Echolink was not bandwidth heavy, so it's very likely that 12Gb or so would last you a long time. Although I did not do so, there are some Bluetooth earpieces and microphones that would allow you to use the T320 in a mobile situation.

The T320 Overall

I enjoyed the T320. It was easy to use and ran all the Android based applications I wanted to, with one exception, AMSAT-Droid, which said it wouldn't run with my configuration. The familiar 'handheld' form factor was a real plus for operating with the VoIP applications and it was odd how I enjoyed using the unit more than using the same applications on my smartphone. Battery life was excellent and the unit did not need to be charged more than once a week or so (in moderate usage).

Some of the applications conflicted with use of the PTT so I found that I only used one of Zello, Teamspeak or Echolink at a time and when I had finished using a particular application, I would go into the Android applications menu and Force Close that application before using another.

A few users have reported WiFi drop-outs and the T320 'buzzing'. This appears to happen as a result of some network traffic being received. A reset seems to clear this – other people have used NetGuard, an application firewall, which runs on the unit, to restrict traffic to known sources, and that seems to have eliminated these problems.

The T320 fitted nicely in my rucksack and I enjoyed using it and having the ability to make contacts all round the world from most locations.

The Inrico TM-7 Mobile Network Radio

The TM-7 is a network radio that looks much more like a mobile or a base station radio. Like its cousin the T320, it's an Android smartphone that has no amateur RF capability. It operates on the 3G network (no 4G) or WiFi. You can also use it as a WiFi hotspot. There are two antenna sockets on the rear, one for the GPS antenna, which is supplied, and one for an external 3G antenna, which is not, should you need to use something better than the supplied internal antenna.

Setup of the TM-7 was very similar indeed to the T320. When I powered it up, the first thing I had to do was to connect it to the WiFi. I noticed that the TM-7 only works with 2.4GHz WiFi rather than 5GHz networks. Not a huge issue, but one to be aware of.

Like the T320, you will need to go into the Play Store and download the applications you want to use – Zello, Teamspeak, Echolink and anything else that takes your fancy. One of the challenges I found with the TM-7 when setting up applications, entering passwords and so on, was the on-screen keyboard. This was quite hard to use, even if you are being careful! Some people I spoke to mentioned that they'd used a Bluetooth keyboard, which sounds like a very good idea. I did find that the on-screen keyboard was very frustrating, particularly if you have lengthy passwords with special characters.

The first application I installed on the TM-7 was Echolink. I connected to GB3IW on the Isle of Wight and had a couple of very pleasant contacts. I did struggle to adjust the volume – I was trying to use what I subsequently discovered was the rotary encoder. If you use the + and – keys to adjust the volume, you will be a lot more successful! It's worth saying that you can use the Button Mapper application (you may want to go for the paid version) to remap keys on either the TM-7 and T320 as you wish. While you are configuring things, you may want to go into the Display settings and set the display to stay on as long as possible – 30 minutes is the maximum value. If you require a longer time, there are various applications available in the Play Store that will keep the display Always On.

It's worth mentioning that if you have downloaded any paid for applications on another Android device, you don't need to pay for it when you download it on a second device. Good news for Teamspeak3 and APRSdroid users!

Zello is free, though, and I installed it on the TM-7 and immediately connected it up to the Network Radios channel where I had a good chat with **Steve Smith G0TDJ**, **Neil Morris G0TVJ** and others. The audio quality on the TM-7 was even better than on the T320 because, presumably, the loudspeaker is a little larger.

Next was to install the TM-7 in the car and try it out. It was a little too large, despite its modest size, to fit in the centre console of my car. However, I found a secure place for it and connected the power cable to the cigar lighter socket via an adapter cable I had.

I found the time taken to 'boot up' the phone was a bit of a limiting factor because, of course, each time I turned the ignition on, the TM-7 had to boot up again. I did find that one of the Zello settings to start the application automatically was quite useful, so I could just switch on the TM-7, drive off and it would connect to my phone's WiFi and then into Zello without having to do anything else. I'm not sure whether this is possible with Teamspeak3, if you want to use IRN as your default, but certainly it doesn't seem to be with Echolink.

Listening to GB3IW via Echolink using the TM-7.

The TM-7 and Zello experience was excellent when using them mobile and the audio quality was particularly impressive. I had some great conversations, particularly on the Network Radios channel, at all sorts of times of day. You can also connect with individual users rather than a particular channel and, notably, I had a very enjoyable chat with **Simon Parker** who writes the always interesting *Comms from Europe* column in our sister magazine, *RadioUser*.

A couple of mornings I used the Echolink client and connected to GB3IW to listen to the Breakfast Club net and hear how the morning was going on the south coast.

I did not test each and every application that I had tried on the T320 on the TM-7 but everything I did try worked in the same way.

The TM-7 Overall

The TM-7 was great fun in the car. Audio quality was very good. The screen is too small to read when you are mobile, so you will essentially have to set it up before you leave and forget it – Zello's autorun feature was very useful here. The fist microphone works well at home, but you can look at a Bluetooth microphone/earpiece to ensure safety when you are mobile. The TM-7 would also be a nice radio to have in the shack where the screen will be much more useful. I have heard of some users running BBC iPlayer on it!

I found the start-up time of the TM-7 a bit annoying while connected to the cigar lighter. If you can get a direct connection to your battery, even better.

Finally

I tried to approach the whole Network Radio concept with an open mind. I confess that I started off feeling that I preferred those applications that allowed me to connect onto amateur RF, such as Echolink and parts of the International Radio Network. As time went on, though, my favourite part of the network proved to be Zello, where on the Network Radios channels (there's now more than one) I encountered nothing but positive experiences and interesting people to speak with.

Rather than replacing 'real radio' I found it was a new facet to the hobby. I liked the fact that I could speak to both licensed and non-licensed operators. The conversations I found on Network Radio seemed to draw people into amateur radio in its wider sense rather than take them away from it.

My thanks to **Chris Taylor G0WTZ** of Moonraker UK Ltd for his loan of the equipment and to the many people that I've spoken to during the review period for the interesting conversations and much advice! The Inrico T320 costs £199.99 and the Inrico TM-7 costs £159.95.
www.moonraker.eu